INFORMATION PRIVACY CONCERN TOWARDS ELECTRONIC RECORD SYSTEMS IN INDIA

SYNOPSIS

by

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Abstract

Information Technology (IT) has added significant value to all businesses, such as banking, finance, FMCG, aviation, healthcare. Information Technology has made almost all businesses efficient and effective by facilitating business transactions in electronic format. Healthcare is a business domain of national importance, which needs careful planning and implementation if healthcare transactions need to record in electronic form. Healthcare transactions, when stored in electronic format, are known as electronic health record (EHR). Healthcare practitioners and policymakers use EHR to reduce costs and give benefits to stakeholders. Many countries have studied EHR adoption and found information privacy concerns a grand challenge in the successful adoption of EHR. The governments of these countries have framed strict privacy laws and policies to address the stakeholders' concerns. India is also on the way to implementing EHR and has drafted health information privacy and security law. As healthcare information privacy concerns vary from culture to culture (country to country), there is a need to understand the healthcare information privacy concern of Indian individuals. Therefore, this study aims to understand the privacy concern of Indian individuals when their healthcare information is stored on electronic health record systems and compare it with other countries.

We identified factors that would affect privacy concerns when health records are stored on electronic record systems. We carried out a detailed literature review to identify the factors. Data were collected from Indian individual who is maintaining their health record either on paper or electronic media. We chose Odisha state as the primary source of data collection because of several ongoing developments in the health care system of Odisha. The Government of Odisha is trying to regulate new healthcare policies and formulate specific laws for the utility of health

services. Structural Equation Modeling has been used for analysis and model design. And finally, we compared the results with the results of Italy and the USA, which we obtained from the literature.

The comparative analysis of EHR between India, Italy, and the USA has revealed a significant impact on healthcare information privacy concerns of Indian individuals when India has moved from paper-based to electronic health record systems. From the data analysis, we have found that trust and control mechanisms are the main factors that influence information privacy towards the adoption of EHR. Regulation and technology also play a crucial role in the successful implementation of EHR. Factors such as convenience, internet experience, and benefits are found to be influencing the privacy concern in our model. We found that Indian citizens were more adaptive towards the new system when strict rules, acts, laws, innovative technologies, and regulations are in place.

Many countries have been facing a challenge in adopting EHR systems due to healthcare information privacy concerns. Our study provides insights if healthcare information privacy concerns may obstruct the successful implementation and adoption of EHR in the Indian context. Indian Healthcare policymakers may use the insights of this study in the better formulation and implementation of EHR.

Keywords: *Electronic Health Record; Privacy; Privacy Concerns; Privacy Concern in Information System; Paper-Based Healthcare System; Manual Healthcare Practices; Health and Privacy; Healthcare Privacy Law; Structural Equation Modeling; DISHA; India*

Introduction

Healthcare services have a significant impact on everyone's life. It affects not only the individual's life but also the other sectors of our society. There are societal impacts, and individual concern arise about the delivery method of health care service. The excellence of healthcare services and economic sustainability are major challenges in all countries. All the representatives from Government agencies and health service providers are involved in delivering the electronic health care service by controlling the cost. India has also started its journey towards the implementation of EHR system. The Indian Government has recommended EHR guidelines and wished healthcare providers to maintain the patient's health record in the EHR system. Moreover, like other nations, India has also proposed an act, named DISHA (Digital Information Security in Healthcare Act), to address potential healthcare information privacy and security concerns of Indian citizens (draft report by the Government of India, Department of Ministry of Health & Family Welfare, November 2017). However, I argue if India can follow the law similar to the US, UK, and other early adopters of electronic health record. Most of the prior studies that focus privacy concerns towards electronic health record are from outside India. We cannot assume outside results applicability because India has its unique healthcare culture. Individual differences and different cultures affect privacy concern (Belanger and Crossler, 2011). Therefore, it is a necessity to (1) understand healthcare information privacy concern (IPC) among Indian citizens with the EHR system and (2) compare privacy concerns of individuals across different geographic countries towards the EHR system.

We carried out a detailed literature review to identify the factors. We used the existing questionnaire, which was used to understand Italian and USA citizens' healthcare data privacy concerns. We chose Odisha state as the primary source of data collection because of several

ongoing developments in the health care system of Odisha. The Government of Odisha is trying to regulate new healthcare policies and formulate specific laws for the utility of health services. Structural Equation Modeling was used for analysis and model design. And finally, we compared the Indian data output with the results of Italy and the USA, which we obtained from the literature. The comparative analysis of EHR between India, Italy, and the USA has revealed a significant impact on healthcare information privacy concerns of Indian individuals when India has moved from paper-based to electronic health record systems.

Research gaps and motivation

The topic "Privacy in Information System" is continuing to evolve in information systems research. While much research is done in this area, research opportunities emerge as technology and practices evolve. Several research articles described various factors influencing privacy concerns, their relationship, and how hierarchical multilevel effects influence others.

Dinev et al. (2016) investigated the individual attitude towards EHR adoption from a privacy perspective and found the factors associated with individual attitudes in Italy and the USA. The cross-cultural difference of information privacy concern has a significant impact on attitude towards EHR. However, there is little research for operationalization empirical validation of attitude towards EHR (ATTEHR) construct in privacy concern in the Indian context.

Individual attitude towards EHR in privacy is culture-sensitive. Validation and adoption of the framework in the Indian cultural context is a research issue yet to be addressed.

Problem statement and research questions

This paper addresses three problems such as, (a) identifies the factors influencing the information privacy concern from the privacy calculus perspective and (b) studies the relationship between the constructs associated with measuring the individual attitudinal behavior towards the electronic health record in the presence of privacy concerns and (c) compare the models between India, the USA, and Italy. Specifically, this study addresses the following research questions (RQ) in the Indian context:

1. How can we measure the attitude of an individual towards electronic health records?
2. What are the factors that influence the attitude towards electronic health records?
3. What are the antecedents of information privacy concern, and how can we measure information privacy concern?
4. In the health care domain, what is the significance of information privacy concern for electronic health records?
5. How do the factors which influence attitude towards electronic health record compare in the context of different countries?

Research objectives

Following are the research objectives of our study:

1. To study an individual's attitude towards electronic health record in the presence of privacy concern in the Indian context.
2. To explore the underlying factors that influence the information privacy concern, which inhibits attitude towards electronic health record.

3. To examine the relationships between privacy concern construct with the attitude towards electronic health record.
4. To determine the reliability and validity of the constructs.
5. To present a comparative model examine the attitudinal behaviors toward electronic health record in India, the USA, and Italy
6. To propose theoretical and managerial implications towards policymaking
7. To help the Government and practitioners better appreciate success factors for implementing the electronic health record system.

Review of literature

In this paper, we have attempted to classify, separate, and produce the findings from existing research. I used the keywords to accomplish a comprehensive and extant literature search. Those keywords are 'privacy', 'privacy concern', 'data privacy and electronic system',' information privacy and security', 'information privacy concern', 'individual and group privacy', 'EHR in India', 'adoption of electronic health record', 'cross-cultural behavior on privacy', 'information privacy and EHR'.

Database Sources

I retrieved a wide range of online databases such as, 'Taylor and Francis', 'Elsevier' (Science Direct), 'JSTOR', 'EBSCO', 'EMERALD', 'SAGE', 'ProQuest', 'MIS Quarterly', 'Web of Science' and 'Google Scholar' to search for useful articles.

Significance effect of IPC on attitude towards EHR

Several theoretical and conceptual papers represented the significant role of IPC in influencing consumer attitude. At the initiation of information technology, people factors like readiness and attitude towards adopting the electronic health record (ATTEHR) beyond the technological challenges. Angst and Agarwal (2009) explained the privacy concern of an individual with concern for information privacy scale by identifying four scopes or dimensions such as error, collection, secondary use of the data, and unauthorized access to the data. From the literature, we draw the research propositions to build a conceptual framework for IPC of individuals towards ATTEHR and the corresponding factors affecting such constructs.

Hypothesis development

We have highlighted that attitude towards EHR is the dependent variable and hypothesized privacy concern negatively affects the attitude towards EHR. Referring to Figure 1, the research model is comprised of multiple theories. Ajzen and Fishbein (1980) argued that an individual's attitude is the desirability of the consequences that arise due to the use of electronic health records through an evaluation of one's belief. We have considered the role of technology acceptance model in our research model. Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh et al. 2003) and Theory of Planned Behavior (TPB) (Ajzen, 1991) are two theoretical frameworks described widely in information science literature. In the context of healthcare, I have adopted the trust theories and psychological control theories to explore the antecedents to privacy concerns. So, the hypothesized (see Figure 1) framework reflects that the perceived effectiveness of technological mechanism and the regulatory mechanism will affect the trust towards medical service providers and affect the privacy control on electronic health record.

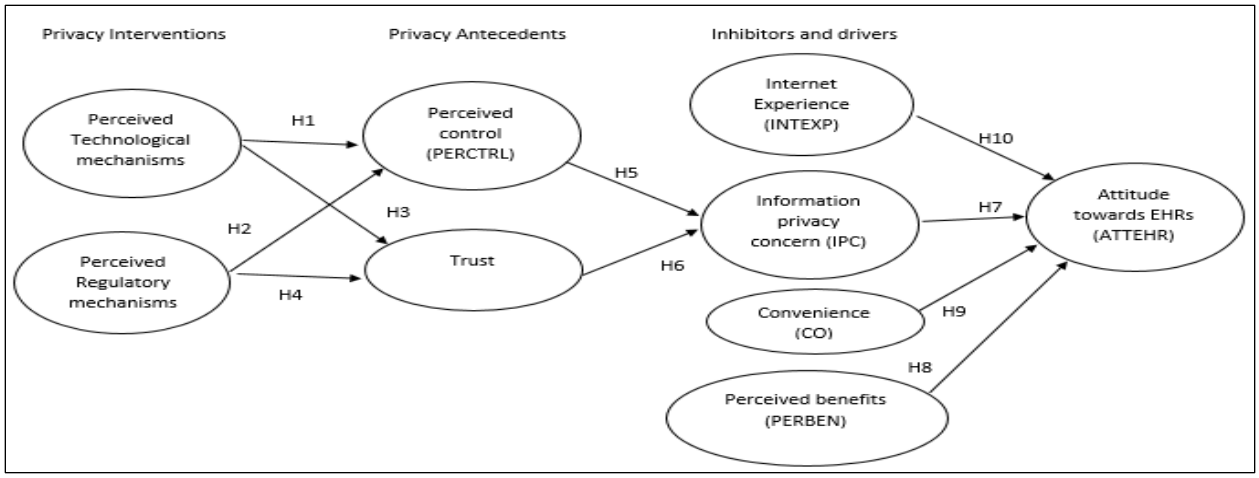


Figure 1. Hypothesized Model: Indian Context *(Source: Dinev et al., 2016)*

Effectiveness of technological mechanism towards privacy control over EHR

In the healthcare system, there are perceived risks and data sensitivity concern raised on EHR. In this regard, privacy interventions such as technological and regulatory are two mechanisms drawn comprehensively on the design phase of EHR. The information is collected, stored on the cloud server, and is not freely available on the internet. Data can be utilized secretly against the individuals in which it may or may not have any impact on it. Therefore, individuals are always looking for a mechanism to control their personal information by themselves. So, the hypothesis formulated as

Hypothesis (H1): Effectiveness of technology will lead to higher data privacy control mechanism over electronic health record (EHR).

Effectiveness of regulatory mechanism towards privacy control over EHR

Bandura (1982) explained and brought the concept of proxy control mechanism when there is a lack of direct control mechanism on security and data privacy, leading the user to surrender the privacy control. In healthcare, users might be in a situation where they have realized that there is lack of resources to control the EHR. It creates a moral boost to adopt the EHR by adding the indirect proxy control mechanism. So, the hypothesis formulated as

Hypothesis (H2): Perceived effectiveness of the regulatory mechanism of individuals leads to higher perceived privacy control on EHR.

Perceived effectiveness of technological mechanism towards trust over EHR

According to Dan et al. 2008, trust plays a major role and becomes the main enabling factor when relationships are characterized by risk, uncertainty, and fear of expediency. Mayer et al. (1995) lucidly defined trust as the capacity, institution based on the belief in the integrity or the desire to depend on another person, and generosity of that other person. So, the hypothesis formulated as

Hypothesis (H3): Perceived effectiveness of technological mechanism will build higher user trust on EHR system.

Perceived effectiveness of regulatory mechanism towards trust over EHR

In the context of healthcare, a service providers' agreement to the rules and regulations, always build user trust on EHR system. According to Johnson and Cullen 2002, privacy regulatory mechanism always builds a trust on the system and users' ability to behave in resourceful way. And it creates a positive attitude among the people to form optimistic results. This will give a lesson to the service providers to build a strong and reliable EHR system to address such cases by adding more value for the success. Therefore, the hypothesis formulated as

Hypothesis (H4): Perceived effectiveness of regulatory mechanism will lead to higher user trust on EHR system.

Trust factor

According to Caudill and Murphy (2000), trust plays a vital role in the e-commerce segment in the information privacy context, and trust lightens the customer privacy concern. Culnan and Bies (2003), identified a strong relationship between trust and information privacy concern. To overcome this aspect of this concern, trust-building would help in a better way

forward. Unless citizens develop high trust and belief in the EHR system, no noticeable options are available to lower the IPC. So, the hypothesis formulated as

Hypothesis (H5): Trust has a negative effect on information privacy concern in EHR.

Perceived privacy control

The researcher found that there is lower privacy concern when people have realized that they have a better sense to control the expose of their personal information and have some mechanism to control for the future use of those data (Stone and Stone 1990; Culnan and Armstrong 1999). In our study about healthcare, I foresee that the same situation could be highlighted: there is a negative relationship between information privacy concern and perceived privacy control mechanism. So, the hypothesis formulated as

Hypothesis (H6): Perceived privacy control has a negative effect on information privacy concern on EHR.

Information privacy concern (IPC)

Angst and Agarwal (2009) claimed that due to the design structure of EHR, it provides a different framework to privacy concerns. Chellappa and Sin (2005) explained that when individuals have a strong concern about privacy, there is less chance to adopt technologies towards EHR use. The same concern had been explained by Angest and Agarwal (2009) and they identified the negative factors that affect the perception of one's belief and the concern towards EHR. So, the hypothesis formulated as

Hypothesis (H7): Individual's IPC will have an adverse effect on ATTEHR.

Convenience

Convenience is defined as the catalyst, or it can be a motivator in e-commerce transactions. Childers et al. (2001) explained that convenience has positive effects on the attitude and behavior of customers when they transact on e-commerce. Convenience is characterized as the person's impression of the essence of a bunch of opportunities that encourage the accomplishment of work. So, the hypothesis formulated as

Hypothesis (H8): Convenience will have a positive effect on attitude towards EHR.

Perceived benefits

Information system researchers have identified perceived benefits are an important component and used as an independent variable for the acceptance of information technology revolutions (MacKay et al. 2004; Beatty et al. 2001). Citizens believe in generosity towards kindness, which directly affects the behavior objectives in the healthcare context (Song and Zahedi 2007). So, I posited that in healthcare, citizens are more likely to have an optimistic attitude when they realized some benefits by using EHR. So, the hypothesis formulated as

Hypothesis (H9): Perceived benefits of EHR will have positive effects on attitude towards EHR.

Internet experience

Researchers identified technology be an integral part of any innovation system. Bansal et al. (2007) found that individuals showed more positive reactions towards adopting new technologies. In this research, I expect similar facts to be enhanced towards EHR and people are

more prone to adopt technology-based service EHR. So, technology adoption, transacting on e-commerce sites, and internet experience will have positive effects on attitude on EHR. So, the hypothesis formulated as

Hypothesis (H10): INTEXP will have a positive effect on ATTEHR

Research methodology

We have formulated the hypotheses in the Indian context, and a conceptual model has been proposed to test the relationship between the construct involved in the study so that the research gaps identified during the literature review may be addressed by answering the research questions. However, to answer research questions and hypothetical tests, it was necessary to have an appropriate methodology.

Research has adopted the structural equation modeling technique. And unit of analysis of this study implies the cross-sectional research and is found appropriate for the study. Construct operationalization has been done by utilizing the pre-existing scales that has been used in a similar context or adapted the scale measurement used in other contexts. In the preliminary stage of data collection, I found survey method is good enough. I have used survey instrument for the collection of data from the respondents. The target population was selected for our research work through a cluster sampling technique. Finally, 382 samples have been collected for our research. Structural equation modeling using SPSS-AMOS vs. 20 software has been found more appropriate for our data analysis.

Result and discussion

For this study, data was collected offline, tested the hypotheses, and answered the research questions to address the research gaps. In this process, the evaluation of our model has been done by examining the validity and reliability of measurement scale used to measure the constructs involved in this study. The data analysis suggests that IPC plays an important role towards the adoption of EHR. There are positive relationships when we evaluate the constructs like technology and regulatory mechanism towards trust and perceived control.

Harman's single factor test is the most sophisticated statistical techniques based on Confirmatory Factor Analysis (CFA). Common method bias stated by Harman (1960) has been tested for whether a single factor explains more than 50% of variance and variance explained by each factor is more than the sum of variance by all other factors. I found in our study 31.486% single factor variance explained, which is less than 50%. All 38 items were related to single factor. The result reveals the single-factor model which has poor fit, representing that CMV is not a key foundation of bias in the experimental items.

The demographic characteristics summary is shown in Table 1, the detailed approximate way the participants were dispersed. Table 2 summarizes the comparison of the demographic characteristics of three different countries.

Table 1.

Sample characteristics (Demographic of Indian Sample)

Characteristics	**Particulars**	**Total (n=373)**	**% (n=373)**
Age	18-25 years	48	12.86
	26-35 years	154	41.28
	36-45 years	87	23.32
	46-60 years	69	18.49
	More than 60 years	15	4.02
Gender	Male	282	75.6
	Female	91	24.4
Marital Status	Married	257	68.9
	Unmarried	116	31.1
Locality	Urban	255	68.4
	Rural	118	31.6
Educational qualifications	High School	13	3.5
	Undergraduate	35	9.4
	Graduation	113	30.3
	Post-graduation	142	38.1
	Engineering	53	14.2
	PhD	13	3.5
	MBBS	04	1.1
Profession	Employee	269	72.1
	Business	30	8.0
	Homemaker	23	6.2
	Self-Employed	09	2.4
	Student	23	6.2
	Retired	15	4.0
	Farmer	4	1.1
Missing	Missing Value	09	2.4

Table 2.

Demographic characteristics comparison of India, Italy and USA samples

Country	**Gender**		**Health Status**	**Satisfaction with current healthcare**	**Internet experience**		
	Male	Female	Mean (SD)	Mean (SD)	Mean (SD) Exp1	Mean (SD) Exp2	Mean (SD) Exp3
India	282	91	3.90 (0.74)	2.69 (1.30)	2.31 (1.17)	2.45 (1.34)	2.29 (1.25)
Italy	98	90	3.41 (0.88)	2.85 (1.13)	1.81 (1.18)	2.32 (1.46)	2.86 (1.46)
USA	119	98	3.17 (1.11)	2.99 (1.43)	2.97 (1.43)	4.00 (1.23)	4.10 (1.28)

Note: Data source for USA and Italy (Dinev et al., 2016)

SD =Standard Deviation.

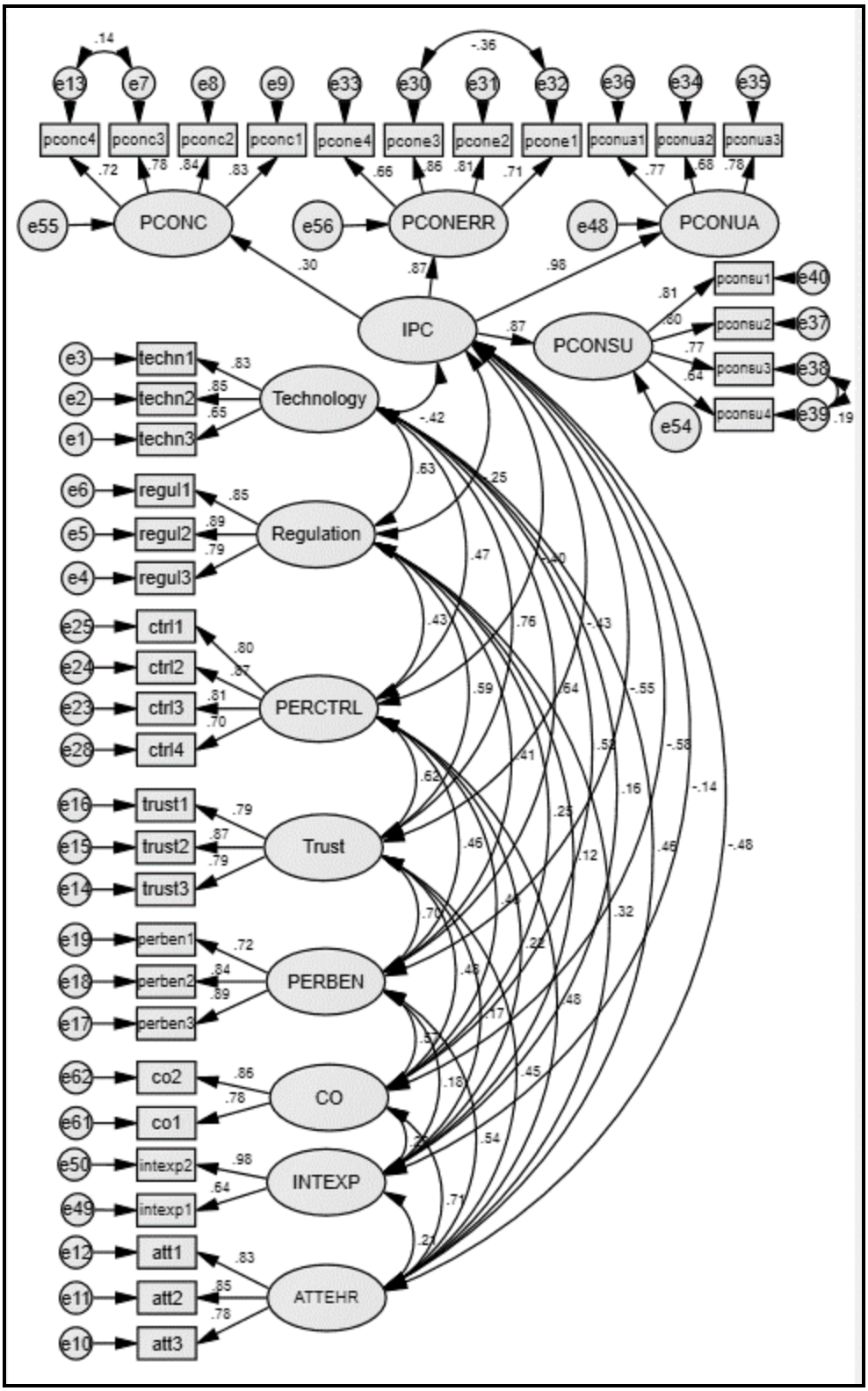


Figure 2. **CFA (Indian Model)**

Table 3.

Item Details (Comparison between India, Italy, and USA)

	India		**Italy**		**U. S. A.**	
	Alpha (α)	**CFA Loading (P<.001)**	**Alpha (α)**	**CFA Loading (P<.01)**	**Alpha (α)**	**CFA Loading (P<.01)**
Technology	0.808		0.87		0.88	
techn1		0.826		0.91		0.90
techn2		0.849		0.91		0.91
techn3		0.650		0.86		0.88
Regulation	0.877		0.89		0.85	
regul1		0.854		0.88		0.85
regul2		0.886		0.92		0.90
regul3		0.786		0.91		0.87
PERCTRL	0.873		0.81		0.84	
ctrl1		0.804		0.76		0.82
ctrl2		0.868		0.82		0.85
ctrl3		0.813		0.87		0.81
ctrl4		0.698		0.76		0.79
ATTEHR	0.861		0.90		0.87	
att1		0.834		0.92		0.89
att2		0.853		0.93		0.89
att3		0.780		0.89		0.89
Trust	0.853		0.72		0.71	
trust1		0.791		0.75		0.67
trust2		0.867		0.83		0.87
trust3		0.788		0.83		0.82
PERBEN	0.851		0.82		0.77	
perben1		0.722		0.84		0.83
perben2		0.844		0.86		0.79
perben3		0.886		0.87		0.85

Table 3. (continued)

Item Details (Comparison between India, Italy, and USA)

	India		Italy		U. S. A	
	Alpha (α)	**CFA Loading (P<.001)**	**Alpha (α)**	**CFA Loading (P<.001)**	**Alpha (α)**	**CFA Loading (P<.001)**
IPC	0.879		0.82		0.80	
PCONC	0.877		0.75		0.82	
pconc1		0.832				
pconc2		0.844				
pconc3		0.780				
pconc4		0.724				
PCONERR	0.820		0.78		0.76	
pcone1		0.706				
pcone2		0.813				
pcone3		0.858				
pcone4		0.662				
PCONUA	0.781		0.84		0.74	
pconua1		0.768				
pconua2		0.685				
pconua3		0.782				
PCONSU	0.846		0.83		0.82	
pconsu1		0.814				
pconsu2		0.796				
pconsu3		0.773				
pconsu4		0.644				
INTEXP	0.765		0.64		0.81	
intexp1		0.635		0.87		0.92
intexp2		0.985		0.84		0.91
CONVENIENCE	0.798		0.80		0.83	
Co1		0.857		0.89		0.96
Co2		0.785		0.93		0.88

Model fit indices for Indian Model:
Chi-square = 1910.119; Degrees of Freedom (DF) = 648; Comparative Fit Index (CFI) = 0.850; Tucker-Lewis Coefficient (TLI) = 0.838; Incremental Fit Index (IFI) = 0.851; Root Mean Square Error of Approximation (RMSEA) = 0.072; TECHNOLOGY = Perceived Technological Mechanism; REGULATION = Perceived Regulatory Mechanism; PERCTRL = Perceived Control; TRUST = Trust; IPC = Information Privacy Concern; PCONC = Collection; PCONE = Errors; PCONUA = Unauthorized Access; PCONSU = Secondary Use; INTEXP = Internet Experience; ATTEHR= Attitude towards Electronic Health Record; PERBEN = Perceived Benefits; CO = Convenience; CFA = Confirmatory Factor Analysis

Reliability and validity of construct

Furthermore, I examined the convergent validity, reliability, and discriminant validity using standardized reliability and validation measures (refer to Table 4). The value of composite reliability can vary between 0 and 1. The higher the value indicates the higher level of internal consistency reliability.

Refer to Table 4, the average variance extracted (AVE) value for INTEXP is 0.687; for Technology is 0.609; for Regulation is 0.711; for ATTEHR is 0.677; for Trust is 0.666; for PERBEN is 0.673; for PERCTRL is 0.637; for IPC is 0.643 and for CO is 0.675. The result indicates AVE value for all the constructs are greater than 0.5. Hence, it suggests convergent validity.

Criteria for discriminant validity

We can conclude that when the Maximum Shared Variance (MSV) value is less than its AVE value of a construct, it leads to discriminant validity. Further, if the square root of average variance extracted (AVE) found more than the inter-construct correlations, it satisfies the norm of discriminant validity (Malhotra and Das, 2010; Hair et al., 2010).

Refer to Table 4, the MSV for INTEXP is 0.048; for Technology is 0.582; for Regulation is 0.401; for ATTEHR is 0.507; for Trust is 0.582; for PERBEN is 0.490; for PERCTRL is 0.391; for IPC is 0.332 and for CO is 0.507. From the result, I found that the MSV value for all the constructs is less than the respective constructs' AVE value. Hence, it suggests discriminant validity.

Table 4. ***Reliability and validity of constructs, Indian model***

	CR	AVE	MSV	MaxR(H)	INTEXP	Technology	Regulation	ATTEHR	TRUST	PERBEN	PERCTRL	IPC	CO
INTEXP	0.807	0.687	0.048	0.971	0.829								
Technology	0.822	0.609	0.582	0.845	**0.165**	0.780							
Regulation	0.880	0.711	0.401	0.888	**0.125**	**0.633**	0.843						
ATTEHR	0.863	0.677	0.507	0.867	**0.205**	**0.457**	**0.320**	0.823					
TRUST	0.857	0.666	0.582	0.864	**0.173**	**0.763**	**0.586**	**0.451**	0.816				
PERBEN	0.860	0.673	0.490	0.878	**0.179**	**0.641**	**0.414**	**0.539**	**0.700**	0.820			
PERCTRL	0.875	0.637	0.391	0.886	**0.219**	**0.466**	**0.429**	**0.478**	**0.625**	**0.464**	0.798		
IPC	0.865	0.643	0.332	0.970	**-0.142**	**-0.422**	**-0.249**	**-0.475**	**-0.428**	**-0.548**	**-0.399**	0.802	
CO	0.806	0.675	0.507	0.814	**0.204**	**0.521**	**0.255**	**0.712**	**0.482**	**0.566**	**0.461**	**-0.576**	0.822

Note: CR (Composite Reliability) > 0.7; AVE (Average Variance Extracted) > 0.5. Hence this study achieves convergent validity. MSV Maximum Shared Variance) < AVE; Square root of AVE (in diagonal, non-bold) greater than inter-construct correlations (in bold font). Consequently, the result suggests for discriminant validity. INTEXP = Internet Experience; Technology = Perceived Technological Mechanism; Regulation = Perceived Regulatory Mechanism; ATTEHR= Attitude towards Electronic Health Record; TRUST = Trust; PERBEN = Perceived Benefits; PERCTRL = Perceived Control; IPC = Information Privacy Concern; CO = Convenience

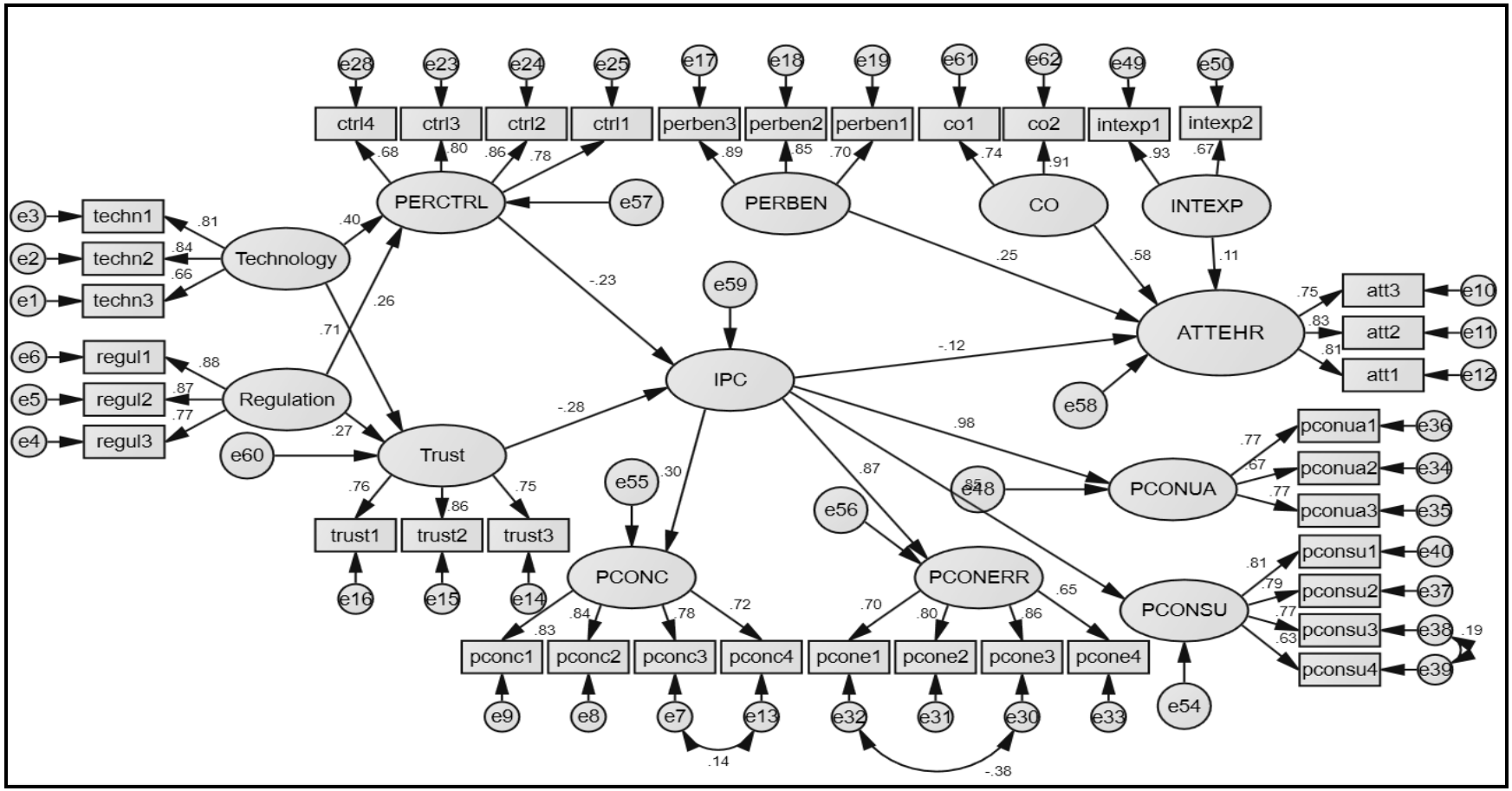


Figure 3. **SEM - Indian Model**

Table 5.

Construct reliability and validity comparison of India, USA and Italy

	India			USA			Italy		
	AVE	**CR**	**Cronbach Alpha (α)**	**AVE**	**CR**	**Cronbach Alpha (α)**	**AVE**	**CR**	**Cronbach Alpha (α)**
ATTEHR	.67	.86	.86	.79	.92	.87	.83	.94	.90
CO	.67	.80	.79	.85	.92	.83	.83	.91	.80
PERCTRL	.63	.87	.87	.67	.89	.84	.64	.88	.81
PCON	.64	.86	.87	.62	.87	.80	.64	.88	.82
PERBEN	.67	.86	.85	.68	.86	.77	.73	.89	.82
REGULATION	.71	.88	.87	.77	.91	.85	.82	.93	.89
TECHNOLOGY	.60	.82	.80	.81	.93	.88	.80	.92	.87
INTEXP	.68	.80	.76	.84	.91	.81	.74	.85	.64
TRUST	.66	.85	.85	.63	.83	.71	.74	.84	.72

Note: CR (Composite Reliability) > 0.7; AVE (Average Variance Extracted) > 0.5. Hence this study achieves convergent validity. INTEXP = Internet Experience; TECHNOLOGY = Perceived Technological Mechanism; REGULATION = Perceived Regulatory Mechanism; ATTEHR= Attitude towards Electronic Health Record; TRUST = Trust; PERBEN = Perceived Benefits; PERCTRL = Perceived Privacy Control; IPC = Information Privacy Concern; CO = Convenience

Source: Italy and USA data, Dinev et. al. (2016)

Table 6.
Relationship Analysis: Direct (Indian Model)

Path	β	S. E	C.R	χ^2	Df	p	GFI	RMSEA	CFI	TLI	Result
Technology vs. PERCTRL	.456	.102	4.470	36.435	13	***	.973	.070	.981	.970	H1 Supported
Technology vs Trust	.756	.093	8.129	34.155	8	***	.970	.094	.977	.957	H3 Supported
Regulation vs PERCTRL	.431	.048	8.979	35.907	13	***	.972	.069	.984	.974	H2 Supported
Regulation vs Trust	.581	.042	13.833	18.537	8	***	.984	.060	.991	.984	H4 Supported
PERCTRL vs. IPC	-.396	.044	-9.000	343.894	144	***	.914	.061	.948	.939	H5 Supported
Trust vs. IPC	-.418	.054	-7.740	292.973	127	***	.922	.059	.954	.944	H6 Supported
PERBEN vs ATTEHR	.536	.050	10.720	24.157	8	***	.979	.074	.986	.974	H8 Supported
INTEXP vs ATTEHR	.243	.040	6.075	2.420	4	***	.997	.000	1.000	1.000	H10 Supported
IPC vs. ATTEHR	-.471	.066	-7.136	271.358	127	***	.926	.055	.960	.952	H7 Supported
CO vs ATTEHR	.706	.060	11.766	5.589	4	***	.994	.033	.998	.996	H9 Supported

Notes: ***= p< 0.001; DF= Degree of Freedom; TLI= Tucker-Lewis coefficient; ; S. E= Standard Error; RMSEA= Root Mean Square Error of Approximation; C. R= Critical Ratio; CFI= Comparative Fit Index; GFI= Goodness of Fit Index; INTEXP = Internet Experience; Technology = Perceived Technological Mechanism; Regulation = Perceived Regulatory Mechanism; ATTEHR= Attitude towards Electronic Health Record; Trust = Trust; PERBEN = Perceived Benefits; PERCTRL = Perceived Control; IPC = Information Privacy Concern; CO = Convenience

Table 7.

Comparison Model Test between India, Italy, and USA

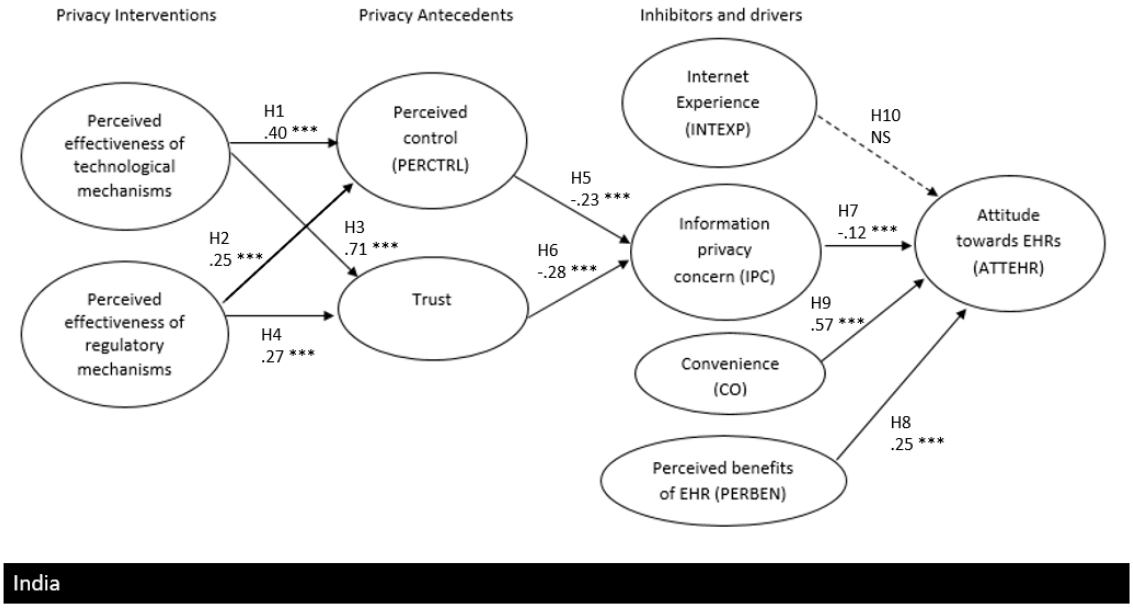
Regression Weights: (Group number 1 - Default model)										
			India				**Italy**		**USA**	
			β	**S.E.**	**C.R.**	**p**	**β**	**p**	**β**	**p**
PERCTRL	←	Technology	0.403	0.085	4.741	***	0.39	**	0.50	**
Trust	←	Technology	0.710	0.083	8.554	***	0.39	**	0.43	**
Trust	←	Regulation	0.271	0.031	8.742	***	0.36	**	0.18	**
PERCTRL	←	Regulation	0.256	0.043	5.953	***	NS	NS	NS	NS
IPC	←	PERCTRL	-0.233	0.046	-5.065	***	-0.13	*	-0.20	*
IPC	←	Trust	-0.283	0.057	-4.965	***	-0.32	**	-0.33	**
PCONC	←	IPC	0.301	0.102	2.951	***				
PCONERR	←	IPC	0.873	0.09	9.700	***				
PCONSU	←	IPC	0.854	0.069	12.377	***				
PCONUA	←	IPC	0.981			***				
ATTEHR	←	IPC	-0.121	0.05	-2.420	.018*	-0.28	**	-0.22	**
ATTEHR	←	PERBEN	0.250	0.04	6.250	***	0.24	**	0.29	**
ATTEHR	←	INTEXP	0.112	0.031	3.613	0.112 NS	NS	NS	0.35	**
ATTEHR	←	CO	0.576	0.054	10.667	***	NS	NS	0.16	

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; NS = not significant; Technology = Perceived Technological Mechanism; Regulation = Perceived Regulatory Mechanism; PERCTRL = Perceived Control; Trust = Trust; IPC = Information Privacy Concern; PCONC =PCON-Collection; PCONE = PCON-Errors; PCONUA = PCON-Unauthorized Access; PCONSU = PCON-Secondary Use; INTEXP = Internet Experience; ATTEHR= Attitude towards Electronic Health Record; PERBEN = Perceived Benefits; CO = Convenience

Source: Italy and USA data, Dinev et. al. (2016)

Structural model for India, Italy and USA

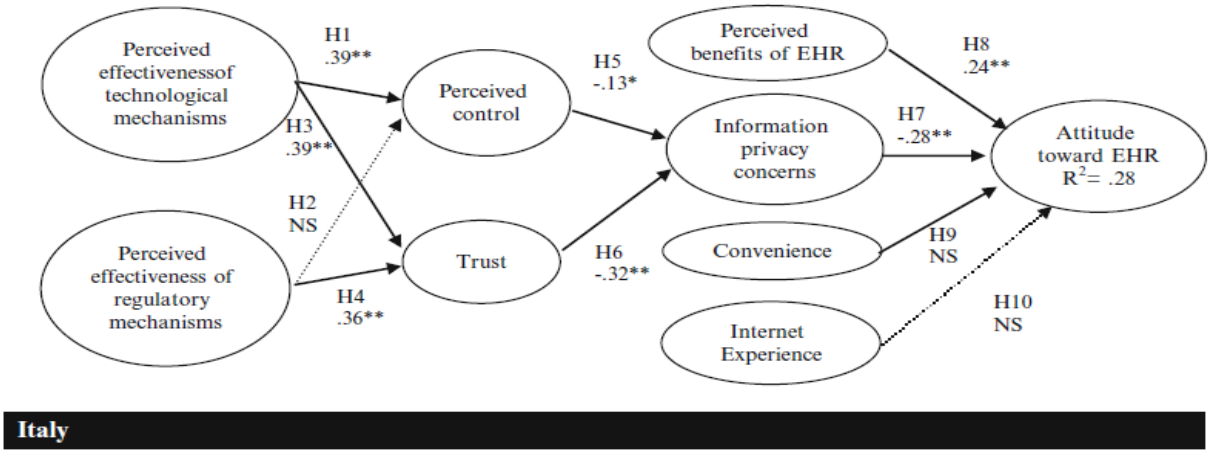
Model: India



Notes: Results of structural model testing in Indian Context. Path coefficients statistical significance: *p < .05; **p < .01; ***p < .001, bold arrow significant path; dashed arrow insignificant path

Figure 4. (Indian Model)

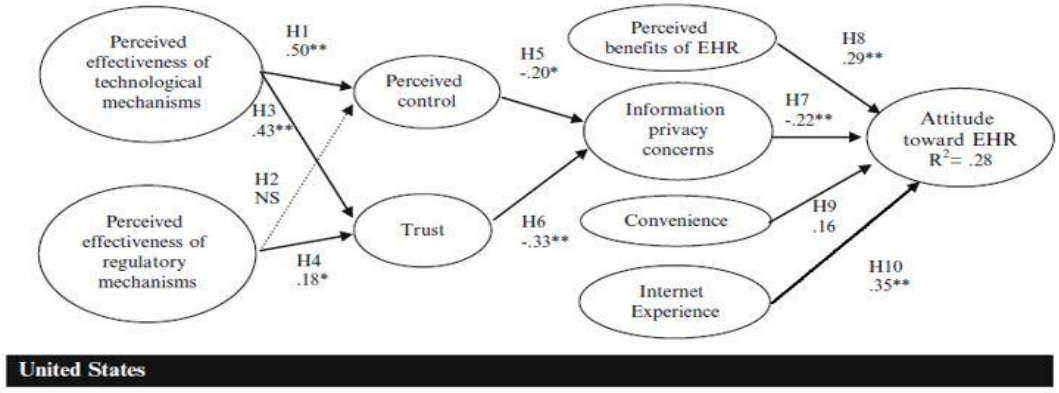
Model: Italy



Notes: Path coefficients' statistical significance: *p < .05; **p < .01, *NS* not significant; *bold arrow* significant path, *dashed arrow*—insignificant path

Figure 5. Source: Dinev et al. (2016)

Model: USA



Notes: Path coefficients' statistical significance: *p < .05; **p < .01, *NS* not significant, *bold arrow* significant path, *dashed arrow* insignificant path

Figure 6. Source: Dinev et al. (2016)

Research limitation and conclusion

Theoretical contributions of this study

The theoretical foundation of this research is privacy calculus, as proposed by Laufer and Wolfe (1977), Culnan and Armstrong (1999), Dinev and Hart (2004, 2006), and Xu et al. (2009). The privacy calculus explored driving and inhibiting factors that impact the intention and behaviour of individuals. The cumulative effect of the drivers and inhibitors ultimately determines the behaviour of an individual.

In the model proposed by Dinev et al. (2016), the drivers for attitude towards EHR were Convenience, Perceived Benefits, and the Internet Experience. The inhibitor in the model was Information Privacy Concern. The antecedents for Information Privacy Concern were Perceived Privacy Control and Trust.

In this study, the model proposed by Dinev et al. (2016) was tested in the Indian context and analysis of the data was done using SEM. The relative importance of the drivers and inhibitors has been analysed to test the theory's strength outlined above.

In the USA, all the factors consisting of 3 drivers and 1 inhibitor were statistically significant influencers on attitude towards EHR. In India, 2 drivers and 1 inhibitor were found to be significant influencers. In Italy, 1 driver and 1 inhibitor were found to be significant influencers. This clearly indicates the importance of regional culture in affecting the attitude towards EHR.

In India, the strength of Convenience is the highest. The Perceived benefits also have a fairly high beta value. However, Information Privacy Concern is a weak inhibitor as evident from the beta value. While Information privacy concern has a relative weak value in other

countries, in India it is weakest. The concern for privacy is evolving in India. As society advances and adopts, many technological systems, the concern for privacy is expected to sharpen. However, at present, the privacy concern remains a less important factor.

Considering that the Convenience and Perceived benefits play a larger role in impacting attitude towards EHR, the success or failure of adoption will depend on the degree of convenience EHR is able to deliver.

The analysis of antecedents of privacy concern reveals that Trust and Perceived Control have the nearly same impact on privacy concern. The factors which affect Trust and Perceived Control are Technology and Regulation. While in India, Regulation impacts Trust and Perceived Control, it is not a significant factor in other countries. Technology has a more considerable impact on both Trust and Perceived Control in the Indian context. Again, this indicated the importance of the regional environment has effect on the model for attitude towards EHR.

The following research questions have been addressed in this research study:

RQ1: How can we measure the attitude of an individual towards electronic health records?

In literature, there are well-documented instruments available for the measurement of attitude towards EHR. Dinev et al. (2016) have adopted the works of Pavlou and Fygenson (2006), Taylor and Todd (1995) and have designed the instrument to measure attitude towards EHR. We have adopted the same instrument and modified the same to make it language and culture appropriate. The instruments were administered in English and vernacular language to appropriate respondents.

RQ2: What are the factors that influence the attitude towards electronic health record?

We have identified from the literature factors which influence the attitude towards EHR. These factors are Convenience and Perceived benefits resulting from the adoption of EHR, Experience with Internet, and Concern for privacy of health records. These factors have been reported to be significant in the USA. We have used these factors for their relevance in influencing attitude towards EHR in the Indian context.

RQ3: What are the antecedents of information privacy concern and how can we measure information privacy concern?

The information privacy concern is treated as a latent variable in this study. The antecedents for information privacy concern are identified as Trust and Perceived Control. These antecedents are latent variables which are impacted by Technology and Regulation. This model is well documented in the literature in Xu (2007) and Angst and Agarwal (2009).

RQ4: In the health care domain, what is the significance of information privacy concern for attitude towards electronic health record?

The Information Privacy concern was a-priori considered as a major factor inhibiting positive attitude towards EHR. However, our study has shown information privacy concern as a weak factor compared to the driving factors. This is a significant finding of the study that at the time of the study, the information privacy concern will not be a stumbling block in the adoption of EHR provided that the drivers such as Convenience and perceived benefits are available in the implementation of EHR system.

RQ5: How do the factors that influence attitude towards electronic health records compare in different countries?

The drivers and inhibitors differ in different countries. Convenience was the biggest driver for a positive attitude towards EHR in India, while Convenience is absent in Italy and has less influence in the USA. Internet Experience is absent in influencing attitude towards EHR in India and Italy while it is present in the USA. Information Privacy Concern has very small strength compared to other factors in impacting attitude towards EHR in India. The strength of IPC is comparable to other factors in the other two countries. Strength of Internet Experience is highest in the USA while it is absent in both India and Italy.

An important contribution of the study is the culture and the environment matter in impacting attitude towards EHR.

Implications for Policy Makers and Institutions

The result of this study has significant important managerial implications for the design, development, and implementation of electronic health care record system. From the result of this study, following are the implications for policymakers and health care institutions:

- Convenience is the most influential factor for attitude towards EHR. Therefore, for successful adoption of EHR, Convenience must be given the prime focus in the design of EHR systems. Policies that inhibit convenience will harm the adoption of EHR. It is possible that in trying to enhance privacy, convenience may be sacrificed to some degree. That would be a wrong policy, according to the findings of this research.
- Perceived benefits are the next most influential factor for attitude towards EHR. Hence, the user should be made aware of the many possible benefits EHR. The investment in awareness campaigns will result in an improved attitude towards EHR.

- The Information Privacy Concern plays a minor role compared to Convenience and Perceived Benefits in impacting attitude towards EHR. However, as seen from history, the concern for privacy assumes importance once the Convenience and Perceived Benefits are taken as given. A few incidents of privacy breaches will lead to sharp decline in a positive attitude towards EHR. Proactive steps should be taken to prevent privacy breaches without compromising the Convenience.
- Unlike in other countries, Regulation plays an important role in influencing Privacy Concern indirectly. The Government needs to be proactive in making regulations to prevent privacy breaches without compromising the Convenience.
- Perceived Control is an important factor that affects the Privacy Concern. The implication of the finding is clear. The system developed for EHR must include control mechanisms by the user to give him the confidence that he is in control of his data.
- Since the drivers are more influential than the inhibitors, EHR implementation in India is expected to be relatively successful provided the systems emphasize convenience and benefits for the users.

Limitation and Scope for future research

The present study is extended research in the Indian context, based on the model proposed by Dinev et al. (2016). The context of research is changed to a developing country India. The following are limitations of the study and scope for future research:

a) The model used in this study is the same as that proposed by Dinev et al. (2016). The R^2 obtained in our model is 0.42, while the R^2 is 0.28 in the case of Italy and

the USA. While the model in India appears to be better, there is scope to improve the R^2.

b) The variables used in our model are the same as that of Dinev et al. (2016). Keeping the cultural context and the evolving attitude towards EHR, other variables need to be explored. The adoption of IT systems in different facets of life is undergoing major changes in India. The platforms are merging and thereby providing a larger bouquet of services. Such services entice the users to adopt many more services. Hence, the effect of variables such as peer pressure, peer behaviour, network effects should be studied.

c) While the effect of Internet Experience was the only variable that differed between models for Italy and the USA, there were some more differences in the model for India. Regulation plays an important role for IPC in India while it had no role in Italy and USA. Internet Experience continues to be an insignificant variable. Therefore, the culture and the social, political, and technology environment have a significant role in attitude towards EHR. This aspect needs to be studied.

d) As in Dinev et al. (2016) study, our study looks at citizen's calculus and cost-benefit analysis, ignoring the perspective from Institutions. This aspect needs to be studied in future research.

e) There are many technology adoption models, such as Technology Adoption Model (TAM) and Theory of Reason Action (TRA). The models may the explored to explain attitude towards EHR.

Conclusions

The research started with reviewing the literature on electronic health records and information privacy concern. Based on the gap observed in the literature, the ten hypotheses were developed to be tested in the Indian context. A questionnaire was developed in both English and vernacular language based on the work by Dinev et al. (2016). The data was collected based on the questionnaire from 382 respondents. The data was tested for reliability and validity using confirmatory factor analysis. A few questionnaire items were discarded, considering their low item loading indicator. The data was analysed in two stages. In the first stage, the data was analysed to explore significant correlations among the latent variables. In the second stage, the data was analysed using SEM for the proposed path model. A comparative study was done among Indian, Italian, and USA contexts. Some significant results were observed in the Indian context, which differs from the other two countries. Convenience and Perceived benefits have much larger impact in comparison to information privacy concern. Regulation is an importance antecedent in the context of India. The theory for EHR applicable in the Indian context was discussed. Implications for managers and policy makers was discussed. Finally, the limitation of the study and scope for the future research was discussed.